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Applications of GIS in Floodplain Management

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***Abstract*----For years, floodplain management studies have been expensive and unwieldy, with much of the analysis performed "by hand" using paper maps. Today, new technologies, such as GIS, GPS, and remote sensing can help the floodplain managers to create accurate and current floodplain maps with improved efficiency and speed at a reasonable cost. Accurate floodplain maps are the key to better floodplain management. This paper describes Application of GIS in Floodplain Management for developing floodplain models and maps.**

I. INTRODUCTION

Accurate and current floodplain maps can be the most valuable tools for avoiding severe social and economic losses from floods. Accurately updated floodplain maps also improve public safety. Early identification of flood-prone properties during emergencies allows public safety organizations to establish warning and evacuation priorities.

GIS can be ideally suited for various floodplain management activities such as, base mapping, topographic mapping, and post-disaster verification of mapped floodplain extents and depths. GIS can be very useful in capturing and communicating a vast amount of information about the study area and the river.

II. BENEFITS

The Application of GIS in Floodplain Management with floodplain computer models allows users to be more productive. Integrated models enable users to devote more time to understanding flooding problems and less time to the mechanical tasks of preparing input data and interpreting the output.

Typical floodplain analysis involves three major steps
1. Data collection and preparation
2. Model development and execution
3. Floodplain mapping

GIS can help in all of these steps as described above.

There are Three Methods of GIS Linkage

1. Interchange Method

The interchange method employs a batch processing approach to interchange (transfer) data between a GIS and a computer model. In this method, there is no direct link between the GIS and the model.

Both the GIS and the model can run separately and independently. The GIS database is pre-processed to extract model input parameters, which are manually copied into a model input file. Similarly, model output data are manually copied in the GIS to create a new layer for presentation mapping purposes.

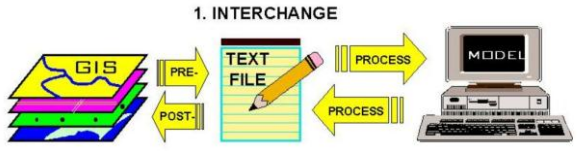

Figure – Interchange Method

2. Interface Method

The interface method can provide a direct link to transfer information between the GIS and the model. The interface method consists of at least the following two components:

A pre-processor, which analyzes and exports the GIS data to create model input files; and

A post-processor, which imports the model output and displays it as a GIS layer.

The interface method basically automates the data interchange method. The automation is accomplished by adding model-specific menus or buttons to the GIS software interface. The model is executed independently from the GIS; however, the input file should be created, at least partially, from within the GIS. The main difference between the interchange and interface methods is the automatic creation of a model input file.

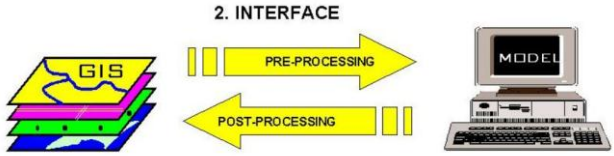

Figure – Interface Method

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3. Integration Method

GIS integration is a combination of a model and a GIS such that the combined program offers both the GIS and the modeling functions. This method represents the closest relationship between GIS and floodplain models. Two integration approaches are possible:

GIS Based Integration: In this approach, modeling modules are developed in or are called from a GIS. All the four tasks of creating model input, editing data, running the model, and displaying output results are available in GIS. There is no need to exit the GIS to edit the data file or run the model.

Model Based Integration: In this method GIS modules are developed in or are called from a computer model

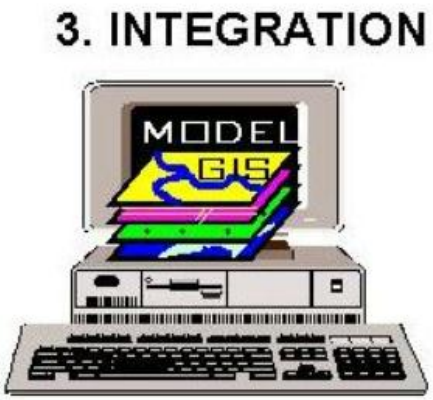

Figure – Integration

III. CONCLUSION

In recent years, the attention of hydrologist and watershed professionals has been turning to the problem of providing a spatial view of the hazard. Then, The Application of GIS in Floodplain Management are huge Particularly in developing countries.

The demand for Application of GIS in Floodplain Management will increase in the future, as more detailed digital environmental sets become available. GIS can be very useful in capturing and communicating a vast amount of information about the study area and the river. GIS can be a spatial decision support system for river and floodplain management. Proving to be life saver for people.

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